IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Shilin Chen
Serial No.:	To be Assigned
Filing Date:	January 27, 2004
Group Art Unit:	To be Assigned
Examiner:	To be Assigned
Title:	**FORCE-BALANCED ROLLER-CONE BITS, SYSTEMS, DRILLING METHODS, AND DESIGN METHODS**

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

REQUEST FOR INTERFERENCE WITH PATENT APPLICATION PURSUANT TO 37 C.F.R. 1.604

The present Application includes Claims 1-27 copied from U.S. Patent Application No. 10/410,470 (the "'470 Application"), published on October 16, 2003 (Publication No. U.S. 2003/0192721 A1). Accordingly, Applicant respectfully requests that the Examiner declare an Interference between the present Application and the '470 Application in view of the following comments.

CLAIMS

For the convenience of the Examiner, all pending claims of the present Application are shown below in numerical order.

1. A roller cone drill bit for drilling an earth formation, comprising:

a bit body;

three roller cones attached to the bit body and able to rotate with respect to the bit body; and

a plurality of cutting elements arranged on each of the roller cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that axial force exerted on the bit during drilling is substantially balanced between the cones, wherein the axial force on the cones is determined by selecting bit design parameters, comprising at least a geometry of a cutting element on said bit;

selecting drilling parameters, comprising at least an axial force on said bit;

selecting an earth formation to be represented as drilled;

calculating from said selected drilling parameters, said selected bit design parameters and said earth formation, parameters for a crater formed when one of a plurality of said cutting elements contacts said earth formation;

calculating a bottomhole geometry, wherein said crater is removed from a bottomhole surface;

simulating incrementally rotating said bit, and repeating said calculating of said crater parameters and said bottomhole geometry, based on calculated roller cone rotation speed and geometrical location with respect to rotation of said roller cone drill bit about its axis; and

summing axial force developed by each of said cutting elements in creating said craters.

2. The drill bit according to Claim 1, wherein said cutting elements are disposed on each cone, such that an amount of work performed by each cone during drilling is substantially the same as the amount of work performed by each of the other cones.

3. The drill bit according to Claim 1, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.

4. The drill bit according to Claim 1, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.

5. The drill bit according to Claim 1, wherein a distribution of axial force on the bit is optimized.

6. The drill bit according to Claim 1, wherein said cutting elements comprise superhard inserts.

7. The drill bit according to Claim 1, wherein said cutting elements comprise tungsten carbide inserts.

8. The drill bit according to Claim 1, wherein said cutting elements comprise milled steel teeth.

9. The drill bit according to Claim 8, wherein said cutting elements further comprise hardface coating.

10. A roller cone drill bit, comprising:

a bit body;

three roller cones attached to said bit body and able to rotate with respect to said bit body; and

a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that an amount of work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.

11. The drill bit according to Claim 10, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.

12. The drill bit according to Claim 10, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.

13. The drill bit according to Claim 10, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.

14. The drill bit according to Claim 10, wherein a distribution of axial force on the bit is optimized.

15. The drill bit according to Claim 10, wherein said cutting elements comprise superhard inserts.

16. The drill bit according to Claim 10, wherein said cutting elements comprise tungsten carbide inserts.

17. The drill bit according to Claim 10, wherein said cutting elements comprise milled steel teeth.

18. The drill bit according to Claim 17, wherein said cutting elements further comprise hardface coating.

19. A roller cone drill bit, comprising:

a bit body;

three roller cones attached to said bit body and able to rotate with respect to said bit body;

a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that a distribution of axial force on the bit is optimized.

20. The drill bit according to Claim 19, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.

21. The drill bit according to Claim 19, wherein said cutting elements are disposed on each cone, such that work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.

22. The drill bit according to Claim 19, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.

23. The drill bit according to Claim 19, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.

24. The drill bit according to Claim 19, wherein said cutting elements comprise superhard inserts.

25. The drill bit according to Claim 19, wherein said cutting elements comprise tungsten carbide inserts.

26. The drill bit according to Claim 19, wherein said cutting elements comprise milled steel teeth.

27. The drill bit according to Claim 26, wherein said cutting elements further comprise hardface coating.

REMARKS

Claims 1-27 are copied from the '470 Application and correspond to Claims 1, 5, 12-14, 22, 25, 27-29, 34, 40-42, 50, 53, 55-56, 141, 149, 153, 160-62, 165 and 167-68, respectively, of the '470 Application. Applicant notes that Claims 85-86, 90, 97-98, 106, 109, 111-14, 118, 125-26, 134, 137 and 139-40 of the '470 Application are identical to Claims 29-30, 34, 41-42, 50, 53, 55, 56-58, 62, 72-73, 78, 81 and 83-84, respectively, of U.S. Patent No. 6,612,384

Applicant's compliance with 37 C.F.R. §1.604 with respect to Applicant's request that the Examiner declare an Interference between the present Application and the '470 Application, is indicated below:

I. 37 C.F.R. §1.604(a)(1)

Applicant proposes the following count:

A roller cone drill bit, comprising:

a bit body;

three roller cones attached to said bit body and able to rotate with respect to said bit body;

a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that a distribution of axial force on the bit is optimized.

Claim 19 of the present Application corresponds exactly to the count.

II. 37 C.F.R. §1.604(a)(2)

Applicant respectfully requests that the Examiner declare an interference between the present Application and U.S. Patent Application No. 10/410,470. Claim 141 of the '470 Application corresponds exactly to the proposed count of Section I above.

III. 37 C.F.R. §1.604(a)(3)

The Interference should be declared because, as shown by the table below, the present Application and the '470 Application claim the same invention.

The Present Application	The '470 Application
1. A roller cone drill bit for drilling an earth formation, comprising:	1. A roller cone drill bit for drilling an earth formation, comprising:
a bit body;	a bit body;
three roller cones attached to the bit body and able to rotate with respect to the bit body; and	three roller cones attached to the bit body and able to rotate with respect to the bit body; and
a plurality of cutting elements arranged on each of the roller cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that axial force exerted on the bit during drilling is substantially balanced between the cones, wherein the axial force on the cones is determined by selecting bit design parameters, comprising at least a geometry of a cutting element on said bit;	a plurality of cutting elements arranged on each of the roller cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that axial force exerted on the bit during drilling is substantially balanced between the cones, wherein the axial force on the cones is determined by selecting bit design parameters, comprising at least a geometry of a cutting element on said bit;
selecting drilling parameters, comprising at least an axial force on said bit;	selecting drilling parameters, comprising at least an axial force on said bit;
selecting an earth formation to be represented as drilled;	selecting an earth formation to be represented as drilled;
calculating from said selected drilling parameters, said selected bit design parameters and said earth formation, parameters for a crater formed when one of a plurality of said cutting elements contacts said earth formation;	calculating from said selected drilling parameters, said selected bit design parameters and said earth formation, parameters for a crater formed when one of a plurality of said cutting elements contacts said earth formation;
calculating a bottomhole geometry, wherein said crater is removed from a bottomhole surface;	calculating a bottomhole geometry, wherein said crater is removed from a bottomhole surface;
simulating incrementally rotating said bit, and repeating said calculating of said crater parameters and said bottomhole geometry, based on calculated roller cone rotation speed and geometrical location with respect to rotation of said roller cone drill bit about its axis; and	simulating incrementally rotating said bit, and repeating said calculating of said crater parameters and said bottomhole geometry, based on calculated roller cone rotation speed and geometrical location with respect to rotation of said roller cone drill bit about its axis; and

The Present Application	**The '470 Application**
summing axial force developed by each of said cutting elements in creating said craters.	summing axial force developed by each of said cutting elements in creating said craters.
2. The drill bit according to Claim 1, wherein said cutting elements are disposed on each cone, such that an amount of work performed by each cone during drilling is substantially the same as the amount of work performed by each of the other cones.	5. The drill bit according to claim 1, wherein said cutting elements are disposed on each cone, such that an amount of work performed by each cone during drilling is substantially the same as the amount of work performed by each of the other cones.
3. The drill bit according to Claim 1, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.	12. The drill bit according to claim 1, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.
4. The drill bit according to Claim 1, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.	13. The drill bit according to claim 1, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.
5. The drill bit according to Claim 1, wherein a distribution of axial force on the bit is optimized.	14. The drill bit according to claim 1, wherein a distribution of axial force on the bit is optimized.
6. The drill bit according to Claim 1, wherein said cutting elements comprise superhard inserts.	22. The drill bit according to claim 1, wherein said cutting elements comprise superhard inserts.
7. The drill bit according to Claim 1, wherein said cutting elements comprise tungsten carbide inserts.	25. The drill bit according to claim 1, wherein said cutting elements comprise tungsten carbide inserts.
8. The drill bit according to Claim 1, wherein said cutting elements comprise milled steel teeth.	27. The drill bit according to claim 1, wherein said cutting elements comprise milled steel teeth.
9. The drill bit according to Claim 8, wherein said cutting elements further comprise hardface coating.	28. The drill bit according to claim 27, wherein said cutting elements further comprise hardface coating.
10. A roller cone drill bit, comprising: a bit body;	29. A roller cone drill bit, comprising: a bit body;

The Present Application	**The '470 Application**
three roller cones attached to said bit body and able to rotate with respect to said bit body; and a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that an amount of work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.	three roller cones attached to said bit body and able to rotate with respect to said bit body; and a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that an amount of work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.
11. The drill bit according to Claim 10, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.	34. The drill bit according to claim 29, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.
12. The drill bit according to Claim 10, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.	40. The drill bit according to claim 29, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.
13. The drill bit according to Claim 10, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.	41. The drill bit according to claim 29, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.
14. The drill bit according to Claim 10, wherein a distribution of axial force on the bit is optimized.	42. The drill bit according to claim 29, wherein a distribution of axial force on the bit is optimized.
15. The drill bit according to Claim 10, wherein said cutting elements comprise superhard inserts.	50. The drill bit according to claim 29, wherein said cutting elements comprise superhard inserts.
16. The drill bit according to Claim 10, wherein said cutting elements comprise tungsten carbide inserts.	53. The drill bit according to claim 29, wherein said cutting elements comprise tungsten carbide inserts.
17. The drill bit according to Claim 10, wherein said cutting elements comprise milled steel teeth.	55. The drill bit according to claim 29, wherein said cutting elements comprise milled steel teeth.

The Present Application	The '470 Application
18. The drill bit according to Claim 17, wherein said cutting elements further comprise hardface coating.	56. The drill bit according to claim 55, wherein said cutting elements further comprise hardface coating.
19. A roller cone drill bit, comprising: a bit body; three roller cones attached to said bit body and able to rotate with respect to said bit body; a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that a distribution of axial force on the bit is optimized.	141. A roller cone drill bit, comprising: a bit body; three roller cones attached to said bit body and able to rotate with respect to said bit body; a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that a distribution of axial force on the bit is optimized.
20. The drill bit according to Claim 19, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.	149. The drill bit according to claim 141, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.
21. The drill bit according to Claim 19, wherein said cutting elements are disposed on each cone, such that work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.	153. The drill bit according to claim 141, wherein said cutting elements are disposed on each cone, such that work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.
22. The drill bit according to Claim 19, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.	160. The drill bit according to claim 141, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.
23. The drill bit according to Claim 19, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.	161. The drill bit according to claim 141, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.
24. The drill bit according to Claim 19, wherein said cutting elements comprise superhard inserts.	162. The drill bit according to claim 141, wherein said cutting elements comprise superhard inserts.

The Present Application	The '470 Application
25. The drill bit according to Claim 19, wherein said cutting elements comprise tungsten carbide inserts.	165. The drill bit according to claim 141, wherein said cutting elements comprise tungsten carbide inserts.
26. The drill bit according to Claim 19, wherein said cutting elements comprise milled steel teeth.	167. The drill bit according to claim 141, wherein said cutting elements comprise milled steel teeth.
27. The drill bit according to Claim 26, wherein said cutting elements further comprise hardface coating.	168. The drill bit according to claim 167, wherein said cutting elements further comprise hardface coating.

There are no differences between Claims 1-27 of the present Application and Claims 1, 5, 12-14, 22, 25, 27-29, 34, 40-42, 50, 53, 55-56, 141, 149, 153, 160-62, 165 and 167-68 of the '470 Application listed side-by-side above. Thus, it is clear that the parties are claiming the same patentable invention.

IV. 37 C.F.R. §1.604(a)(5) SUPPORT FOR COPIED CLAIMS

Applicant respectfully contends that Claims 1-27 of the present Application are fully supported by the specification of the present Application as originally filed. Applicant provides below, examples of specific portions of the specification that support specific claim limitations of Claims 1-27. Applicant does not intend this list to be exhaustive of all support for Claims 1-27 that is present in the specification of the present Application.

For the convenience of the Examiner, Applicant has reproduced specific portions of the specification of the present Application, in the attached Exhibit A. Such portions were reproduced from the cited "Support in the Specification", below, and are applied to their respective claim limitations in Exhibit A.

Claims	Support in the Specification
1. A roller cone drill bit for drilling an earth formation, comprising:	Figure 11.

Claims	Support in the Specification
a bit body;	Figure 11.
three roller cones attached to the bit body and able to rotate with respect to the bit body; and	Figure 11. Page 12, lines 3-9.
a plurality of cutting elements arranged on each of the roller cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that axial force exerted on the bit during drilling is substantially balanced between the cones, wherein the axial force on the cones is determined by selecting bit design parameters, comprising at least a geometry of a cutting element on said bit;	Page 7, lines 7-9. Page 13, line 28 – Page 14, line 2. Page 15, line 27 – Page 16, line 4. Page 17, lines 9-15. Page 26, lines 2-4. Page 11, lines 10-12.
selecting drilling parameters, comprising at least an axial force on said bit;	Page 12, lines 24-25. Page 15, lines 27-30. Page 16, lines 11-12.
selecting an earth formation to be represented as drilled;	Page 11, lines 14-25.
calculating from said selected drilling parameters, said selected bit design parameters and said earth formation, parameters for a crater formed when one of a plurality of said cutting elements contacts said earth formation;	*See* U.S. Patent Application No. 10/383,805 ("'805 Application")[1], Page 27, lines 8-9. *See* U.S. Provisional Application 60/098,466 ("'466 Provisional")[2], Flowchart.
calculating a bottomhole geometry, wherein said crater is removed from a bottomhole surface;	Page 12, lines 10-11.

[1] The '805 Application is the application from which the present Application is a continuation.
[2] The '466 Provisional is incorporated by reference into the present Application. *See* Present Application, Page 1, lines 7-8.

Claims	Support in the Specification
simulating incrementally rotating said bit, and repeating said calculating of said crater parameters and said bottomhole geometry, based on calculated roller cone rotation speed and geometrical location with respect to rotation of said roller cone drill bit about its axis; and	Page 12, lines 10-14. *See* U.S. Patent No. 6,095,262 (the "'262 Patent)[3], Column 7, lines 20-47.
summing axial force developed by each of said cutting elements in creating said craters.	Page 12, lines 11-17.
2. The drill bit according to Claim 1, wherein said cutting elements are disposed on each cone, such that an amount of work performed by each cone during drilling is substantially the same as the amount of work performed by each of the other cones.	Page 12, line 27 - Page 13, line 13. Page 15, line 28 - Page 16, line 4. Page 16, lines 9-18.
3. The drill bit according to Claim 1, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.	Page 8, lines 20-21. Page 16, lines 14-18. Page 17, lines 5-8. Page 17, lines 23-24. *See* '466 Provisional, Pages 5 and 7.
4. The drill bit according to Claim 1, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.	Page 11, line 12 - Page 12, line 21.
5. The drill bit according to Claim 1, wherein a distribution of axial force on the bit is optimized.	Page 1, lines 11-12. Page 7, line 32 – Page 8, line 2. Page 26, lines 2-4.
6. The drill bit according to Claim 1, wherein said cutting elements comprise superhard inserts.	Page 4, lines 9-10.
7. The drill bit according to Claim 1, wherein said cutting elements comprise tungsten carbide inserts.	Page 4, lines 9-10.

[3] The '262 Patent is incorporated by reference into the present Application. *See* Present Application, Page 9, lines 18-26.

Claims	Support in the Specification
8. The drill bit according to Claim 1, wherein said cutting elements comprise milled steel teeth.	Page 4, line 7.
9. The drill bit according to Claim 8, wherein said cutting elements further comprise hardface coating.	Page 4, lines 7-9.
10. A roller cone drill bit, comprising:	Figure 11.
a bit body;	Figure 11.
three roller cones attached to said bit body and able to rotate with respect to said bit body; and	Figure 11. Page 12, lines 3-9.
a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that an amount of work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.	Page 12, line 27 - Page 13, line 13. Page 15, line 28 - Page 16, line 4. Page 16, lines 9-18.
11. The drill bit according to Claim 10, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.	Page 7, lines 7-9. Page 26, lines 2-4.
12. The drill bit according to Claim 10, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.	Page 8, lines 20-21. Page 16, lines 14-18. Page 17, lines 5-8. Page 17, lines 23-24. *See* '466 Provisional, Pages 5 and 7.
13. The drill bit according to Claim 10, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.	Page 11, line 12 - Page 12, line 21.
14. The drill bit according to Claim 10, wherein a distribution of axial force on the bit is optimized.	Page 1, lines 11-12. Page 7, line 32 – Page 8, line 2. Page 26, lines 2-4.

Claims	**Support in the Specification**
15. The drill bit according to Claim 10, wherein said cutting elements comprise superhard inserts.	Page 4, lines 9-10.
16. The drill bit according to Claim 10, wherein said cutting elements comprise tungsten carbide inserts.	Page 4, lines 9-10.
17. The drill bit according to Claim 10, wherein said cutting elements comprise milled steel teeth.	Page 4, line 7.
18. The drill bit according to Claim 17, wherein said cutting elements further comprise hardface coating.	Page 4, lines 7-9.
19. A roller cone drill bit, comprising:	Figure 11.
a bit body;	Figure 11.
three roller cones attached to said bit body and able to rotate with respect to said bit body;	Figure 11. Page 12, lines 3-9.
a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that a distribution of axial force on the bit is optimized.	Page 1, lines 11-12. Page 7, line 32 – Page 8, line 2. Page 26, lines 2-4.
20. The drill bit according to Claim 19, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.	Page 7, lines 7-9. Page 26, lines 2-4.
21. The drill bit according to Claim 19, wherein said cutting elements are disposed on each cone, such that work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.	Page 12, line 27 - Page 13, line 13. Page 15, line 28 - Page 16, line 4. Page 16, lines 9-18.

Claims	Support in the Specification
22. The drill bit according to Claim 19, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.	Page 8, lines 20-21. Page 16, lines 14-18. Page 17, lines 5-8. Page 17, lines 23-24. *See* '466 Provisional, Pages 5 and 7.
23. The drill bit according to Claim 19, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.	Page 11, line 12 - Page 12, line 21.
24. The drill bit according to Claim 19, wherein said cutting elements comprise superhard inserts.	Page 4, lines 9-10.
25. The drill bit according to Claim 19, wherein said cutting elements comprise tungsten carbide inserts.	Page 4, lines 9-10.
26. The drill bit according to Claim 19, wherein said cutting elements comprise milled steel teeth.	Page 4, line 7.
27. The drill bit according to Claim 26, wherein said cutting elements further comprise hardface coating.	Page 4, lines 7-9.

V. REQUEST FOR THE BENEFIT OF THE FILING DATES OF APPLICANT'S PRIORITY APPLICATIONS

Applicant claims priority under 35 U.S.C. 120 based upon U.S. Patent Application Serial No. 10/383,805 (the "'805 Application"), filed March 8, 2003, which is a continuation from U.S. Patent Application Serial No. 09/833,016 (the "'016 Application"), filed April 10, 2001, which is a continuation of U.S. Patent Application Serial No. 09/387,737 (the "'737 Application"), filed August 31, 1999, now U.S. Patent No. 6,213,225. The present Application is a continuation of the '805 Application which is a continuation of the '016 Application which is a continuation of the '737 Application. Therefore, the application of the

terms of Claims 1-27 to the specification of the present Application in Section IV above applies to the '805, '016 and '737 Applications as well.

The August 31, 1999 filing date of the '737 Application precedes the June 8, 2000 filing date of the U.S. Patent Application No. 09/590,577, now U.S. Patent No, 6,612,384, of which the '470 Application is a continuation. Therefore, Chen should be the senior party in the interference.

Applicant further claims priority under 35 U.S.C. 119(e) based on provisional application No. 60/098,466 filed August 31, 1998. Applicant is entitled to the benefit of the filing dates of his earlier filed applications for interference purposes if the count reads on at least one adequately disclosed embodiment in the earlier application.[4]

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[4] *See Weil v. Fritz*, 572 F.2d 856, 865-66 n.16, 196 USPQ 600, 608 n.16 (CCPA 1978).

CONCLUSION

Applicant has made an earnest attempt to place this case in condition for allowance. For the foregoing reasons, and for other reasons clearly apparent, Applicant respectfully requests full allowance of all pending claims. Furthermore, Applicant respectfully requests that the Examiner declare an Interference between the present Application and the '470 Application. If the Examiner feels that a telephone conference or an interview would advance prosecution of the present Application in any manner, the undersigned attorney for Applicant stands ready to conduct such a conference at the convenience of the Examiner.

If the Examiner determines that at least one of the claims copied from the '470 Application is allowable, Applicant respectfully requests that the Examiner declare an interference, in accordance with MPEP 2303, which states that "[i]f the applications each contain one claim drawn to the same patentable invention (37 CFR 1.601(n)), the examiner proceeds to propose the interference . . . ." *See MPEP 2303.*

The Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. **50-2148** of Baker Botts L.L.P.

Respectfully submitted,

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Luke K. Pedersen
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Date: January 27, 2004

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EXHIBIT A
Support for Claims 1-27

Reproduced below, are portions of the specification of the present Application that are examples of support in the present Application for each limitation of Claims 1-27 delineated below. This list is not intended to be exhaustive.

I. Support for Claim 1

A. ***A roller cone drill bit for drilling an earth formation, comprising:***

1. *See Present Application, Figure 11.*

B. ***a bit body;***

1. *See Present Application, Figure 11.*

C. ***three roller cones attached to the bit body and able to rotate with respect to the bit body; and***

1. *See Present Application, Figure 11.*

2. (1) The bit kinematics is described by bit rotation speed, Ω=RPM (revolutions per minute), and the rate of penetration, ROP. Both RPM and ROP may be considered as constant or as function with time.

(2) The cone kinematics is described by cone rotational speed. Each cone may have its own speed. The initial value is calculated from the bit geometric parameters or just estimated from experiment. In the calculation the cone speed may be changed based on the torque acting on the cone. *See Present Application, Page 12, lines 3-9.*

D. ***a plurality of cutting elements arranged on each of the roller cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that axial force exerted on the bit during drilling is substantially balanced between the cones, wherein the axial force on the cones is determined by selecting bit design parameters, comprising at least a geometry of a cutting element on said bit;***

1. The present application teaches that roller cone bit designs should have equal mechanical downforce on each of the cones. *See Present Application, Page 7, lines 7-9.*

2. The first step in the optimization procedure is to choose the design variables. Consider a cone of a steel tooth bit as shown in **Figure 3**. The cone has three rows. For the sake of simplicity, the journal angle, the offset and the cone profile will be fixed and will not be as design variables. Therefore the only design variables for a row are the crest length, Lc, the radial position of the center of the crest

length, Rc, and the tooth angles, α and β. Therefore, the number of design variables is 4 times of the total number of rows on a bit. *See Present Application, Page 13, line 28 through Page 14, line 2.*

3. The procedure begins by reading the bit geometry and other operational parameters. The forces on the teeth, cones, bearings, and bit are then calculated. Once the forces are known, they are compared, and if they are balanced, then the design is optimized. If the forces are not balanced, then the optimization must occur. Objectives, constraints, design variables and their bounds (maximum and minimum allowed values) are defined, and the variables are altered to conform to the new objectives. Once the new objectives are met, the new geometric parameters are used to re-design the bit, and the forces are again calculated and checked for balance. This process is repeated until the desired force balance is achieved. *See Present Application, Page 15, line 27 through Page 16, line 4.*

4. According to another disclosed class of innovative embodiments, there is provided: A rotary drilling system, comprising: a drill string which is connected to conduct drilling fluid from a surface location to a rotary drill bit; a rotary drive which rotates at least part of said drill string together with said bit said rotary drill bit comprising a plurality of arms; rotatable cutting structures mounted on respective ones of said arms; and a plurality of teeth located on each of said cutting structures; wherein approximately the same axial force is acting on each said cutting structure. *See Present Application, Page 17, lines 9-15.*

5. Roller cone drilling wherein the bit optimization process equalizes the downforce (axial force) for the cones (as nearly as possible, subject to other design constraints). Bit performance is significantly enhanced by equalizing downforce. *See Present Application, Page 26, lines 2-4.*

6. Each element used in the present invention has a square cross section with area S_e (its cross-section on the x-y plane) and length L_e (along the z axis). *See Present Application, Page 11, lines 10-12.*

E. ***selecting drilling parameters, comprising at least an axial force on said bit;***

1. The applied forces to bit are the weight on bit (WOB) and torque on bit (TOB). *See Present Application, Page 12, lines 24-25.*

2. The procedure begins by reading the bit geometry and other operational parameters. The forces on the teeth, cones, bearings, and bit are then calculated. Once the forces are known, they are compared, and if they are balanced, then the design is optimized. *See Present Application, Page 15, lines 27-30.*

3. This calculation is based on input data of bit geometry, rock properties, and operational parameters. *See Present Application, Page 16, lines 11-12.*

F. ***selecting an earth formation to be represented as drilled;***

1. $F_{ze} = k_e \quad \sigma * S_e \qquad (1)$

$$F_{xe} = \mu_x * F_{ze} \quad (2)$$

$$F_{ye} = \mu_y * F_{ze} \quad (3)$$

where F_{ze} is the normal force and F_{xe}, F_{ye} are side forces, respectively, σ is the compressive strength, S_e the cutting depth and k_e, μ_x and μ_y are coefficient associated with formation properties. These coefficients may be determined by lab test. A tooth or an insert can always be divided into several elements. Therefore, the total force on a tooth can be obtained by integrating equation (1) to (3). The single element force model used in the invention has significant advantage over the single tooth or single insert model used in most of the publications. The only way to obtain a force model is by lab test. There are many types of inserts used today for roller cone bit depending on the rock type drilled. *See Present Application, Page 11, lines 14-25.*

G. ***calculating from said selected drilling parameters, said selected bit design parameters and said earth formation, parameters for a crater formed when one of a plurality of said cutting elements contacts said earth formation;***

1. (d) calculating the volume of formation displaced by a crater enlargement parameter function. *See '805 Application, Page 27, lines 8-9.*

2. *See '466 Provisional, Flowchart.*

H. ***calculating a bottomhole geometry, wherein said crater is removed from a bottomhole surface;***

1. (3) At the initial time, t0, the hole bottom is considered as a plane and is meshed into small grids. The tooth is also meshed into grids (single elements). *See Present Application, Page 12, lines 10-11.*

I. ***simulating incrementally rotating said bit, and repeating said calculating of said crater parameters and said bottomhole geometry, based on calculated roller cone rotation speed and geometrical location with respect to rotation of said roller cone drill bit about its axis; and***

1. (3) At the initial time, t0, the hole bottom is considered as a plane and is meshed into small grids. The tooth is also meshed into grids (single elements). At any time t, the position of a tooth in space is fully determined. If the tooth is in interaction with the hole bottom, the hole bottom is updated and the cutting depth for each cutting element is calculated and the forces acting on the elements are obtained. *See Present Application, Page 12, lines 10-14.*

2. The tooth trajectory, speed, scraping distance, crater distribution, coverage ratio and tracking ratios for all rows, cones, and the bit are calculated (step 124). This section of the process (depicted in FIG. 1B) gives the teeth motion over the hole bottom, and displays the results (step 126).

Next the bit mechanics are calculated. (See FIG. 1C.) Again transformation matrices from cone to bit coordinates are calculated (step 128), and the number of bit revolutions and maximum time steps, delta, are input (step 130). The

cones are then counted (step 132), the bit and cone rotation angles are calculated at the given time step (step 134), and the rows are counted (step 136). Next, the 3D tooth surface matrices for the teeth on a given row are calculated (step 138). The teeth are then counted (step 140), and the 3D position of the tooth on the hole bottom is calculated at the given time interval (step 142). If a tooth is not cutting, counting continues until a cutting tooth is reached (step 144). The cutting depth, area, volume and forces for each tooth are calculated, and the hole bottom model is updated (based on the crater model for the type of rock being drilled). Next the number of teeth cutting at any given time step is counted. The tooth force is projected into cone and bit coordinates, yielding the total cone and bit forces and moments. Finally the specific energy of the bit is calculated (step 146). *See '262 Patent, Column 7, lines 20-47.*

J. ***summing axial force developed by each of said cutting elements in creating said craters.***

1. At any time t, the position of a tooth in space is fully determined. If the tooth is in interaction with the hole bottom, the hole bottom is updated and the cutting depth for each cutting element is calculated and the forces acting on the elements are obtained.

(4) The element forces are integrated into tooth forces, the tooth forces are integrated into cone forces, the cone forces are transferred into bearing forces and the bearing forces are integrated into bit forces. *See Present Application, Page 12, lines 11-17.*

II. Support for Claim 2

A. ***The drill bit according to Claim 1, wherein said cutting elements are disposed on each cone, such that an amount of work performed by each cone during drilling is substantially the same as the amount of work performed by each of the other cones.***

1. With reference to **Figure 2**, the balance condition of a roller cone bit may be evaluated using the following criteria:

$$\mathrm{Max}\,(\omega 1, \omega 2, \omega 3) - \mathrm{Min}\,(\omega 1, \omega 2, \omega 3) <= \omega 0 \qquad (4)$$
$$\mathrm{Max}\,(\eta 1, \eta 2, \eta 3) - \mathrm{Min}\,(\eta 1, \eta 2, \eta 3) <= \eta 0 \qquad (5)$$
$$\mathrm{Max}\,(\lambda 1, \lambda 2, \lambda 3) - \mathrm{Max}\,(\lambda 1, \lambda 2, \lambda 3) <= \lambda 0 \qquad (6)$$
$$\xi = F_r \,/\, WOB * 100\,\% <= \xi 0 \qquad (7)$$

where ωi ($i = 1, 2, 3$) is defined by $\omega i = WOBi / WOB * 100\,\%$, WOBi is the weight on bit taken by cone i. ηi is defined by $\eta i = Fzi / \Sigma Fzi * 100\,\%$ with Fzi being the i-th cone axial force. And λi is defined by $\lambda i = Mzi / \Sigma Mzi \quad 100\,\%$ with Mzi being the i-th cone moment in the direction perpendicular to i-th cone axis. Finally ξ is the bit imbalance force ratio with F_r being the bit imbalance force. A bit is perfectly balanced if:

$$\omega 1 = \omega 2 = \omega 3 = 33.333\,\% \text{ or } \omega 0 = 0.0\,\%$$

$\eta 1 = \eta 2 = \eta 3 = 33.333\ \%$ or $\eta 0 = 0.0\ \%$
$\lambda 1 = \lambda 2 = \lambda 3 = 33.333\ \%$ or $\lambda 0 = 0.0\ \%$
$\xi = 0.0\ \%$

In most cases if $\omega 0$, $\eta 0$, $\lambda 0$, $\xi 0$ are controlled with some limitations, the bit is balanced. *See Present Application, Page 12, line 27 through Page 13, line 13.*

2. The forces on the teeth, cones, bearings, and bit are then calculated. Once the forces are known, they are compared, and if they are balanced, then the design is optimized. If the forces are not balanced, then the optimization must occur. Objectives, constraints, design variables and their bounds (maximum and minimum allowed values) are defined, and the variables are altered to conform to the new objectives. Once the new objectives are met, the new geometric parameters are used to re-design the bit, and the forces are again calculated and checked for balance. This process is repeated until the desired force balance is achieved. *See Present Application, Page 15, line 28 through Page 16, line 4.*

3. In the preferred embodiment of the present disclosure, a roller cone bit is provided for which the volume of formation removed by each tooth in each row, of each cutting structure (cone), is calculated. This calculation is based on input data of bit geometry, rock properties, and operational parameters. The geometric parameters of the roller cone bit are then modified such that the volume of formation removed by each cutting structure is equalized. Since the amount of formation removed by any tooth on a cutting structure is a function of the force imparted on the formation by the tooth, the volume of formation removed by a cutting structure is a direct function of the force applied to the cutting structure. By balancing the volume of formation removed by all cutting structures, force balancing is also achieved. *See Present Application, Page 16, lines 9-18.*

III. Support for Claim 3

A. ***The drill bit according to Claim 1, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.***

1. The roller cone bit is energy balanced such that each of the cutting structures drill substantially equal volumes of formation. *See Present Application, Page 8, lines 20-21.*

2. Since the amount of formation removed by any tooth on a cutting structure is a function of the force imparted on the formation by the tooth, the volume of formation removed by a cutting structure is a direct function of the force applied to the cutting structure. By balancing the volume of formation removed by all cutting structures, force balancing is also achieved. *See Present Application, Page 16, lines 14-18.*

3. A roller cone drill bit comprising: a plurality of arms; rotatable cutting structures mounted on respective ones of said arms; and a plurality of teeth located on

each of said cutting structures; wherein a substantially equal volume of formation is drilled by each said cutting structure. *See Present Application, Page 17, lines 5-8.*

4. (e) repeating steps (a) through (d) until substantially the same volume of formation is cut by each of said cutting structures of said bit. *See Present Application, Page 17, lines 23-24.*

5. The third application of the Row Cutting Ratio is to help to design a balanced cutting structure. This can be done by comparing the ratios of all the rows of a bit as shown in Fig. 3. Under the ideal condition, the Row Cutting Ratio of all rows should have the same value.

The Cone Cutting Ratio is defined as

$$\text{Cone Cutting Ratio\_n} = (\text{Sconecut} / \text{Sbottom}) * 100\% \qquad (3)$$

where Sconecut is the sum of cutting areas by all the teeth on a cone and Sbottom is the whole area of bottom and n represents the number of bit revolutions. *See '466 Provisional, Pages 5 and 7.*

IV. Support for Claim 4

A. ***The drill bit according to Claim 1, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.***

1. The force-cutting relationship for this single element may be described by:

$$F_{ze} = k_e * \sigma * S_e \qquad (1)$$

$$F_{xe} = \mu_x * F_{ze} \qquad (2)$$

$$F_{ye} = \mu_y * F_{ze} \qquad (3)$$

where F_{ze} is the normal force and F_{xe}, F_{ye} are side forces, respectively, σ is the compressive strength, S_e the cutting depth and k_e, μ_x and μ_y are coefficient associated with formation properties. These coefficients may be determined by lab test. A tooth or an insert can always be divided into several elements. Therefore, the total force on a tooth can be obtained by integrating equation (1) to (3). The single element force model used in the invention has significant advantage over the single tooth or single insert model used in most of the publications. The only way to obtain a force model is by lab test. There are many types of inserts used today for roller cone bit depending on the rock type drilled. If the single insert force model is used, a lot of tests have to be done and this is very difficult if not impossible. By using the element force model, only a few tests may be enough because any kind of insert or tooth can be always divided into elements. In other words, one element model may be applied to all kinds of inserts or teeth.

After having the single element force model, the next step is to determine the interaction between inserts and the formation drilled. This step involves the

determination of the tooth kinematics (local) from the bit and cone kinematics (global) as described below.

(1) The bit kinematics is described by bit rotation speed, Ω=RPM (revolutions per minute), and the rate of penetration, ROP. Both RPM and ROP may be considered as constant or as function with time.

(2) The cone kinematics is described by cone rotational speed. Each cone may have its own speed. The initial value is calculated from the bit geometric parameters or just estimated from experiment. In the calculation the cone speed may be changed based on the torque acting on the cone.

(3) At the initial time, t0, the hole bottom is considered as a plane and is meshed into small grids. The tooth is also meshed into grids (single elements). At any time t, the position of a tooth in space is fully determined. If the tooth is in interaction with the hole bottom, the hole bottom is updated and the cutting depth for each cutting element is calculated and the forces acting on the elements are obtained.

(4) The element forces are integrated into tooth forces, the tooth forces are integrated into cone forces, the cone forces are transferred into bearing forces and the bearing forces are integrated into bit forces.

(5) After the bit is fully drilled into the rock, these forces are recorded at each time step. A period time usually at least 10 seconds is simulated. The average forces may be considered as static forces and are used for evaluation of the balance condition of the cutting structure. *See Present Application, Page 11, line 12 through Page 12, line 21.*

V. Support for Claim 5

A. ***The drill bit according to Claim 1, wherein a distribution of axial force on the bit is optimized.***

1. The present invention relates to down-hole drilling, and especially to the optimization of drill bit parameters. *See Present Application, Page 1, lines 11-12.*

2. The present application describes bit design procedures which provide optimization of downforce balancing as well as other parameters. *See Present Application, Page 7, line 32 through Page 8, line 2.*

3. See Paragraph I(D)(5) above. *See Present Application, Page 26, lines 2-4.*

VI. Support for Claim 6

A. ***The drill bit according to Claim 1, wherein said cutting elements comprise superhard inserts.***

1. Insert bits have very hard inserts (e.g. specially selected grades of tungsten carbide) pressed into holes drilled into the cone surfaces. *See Present Application, Page 4, lines 9-10.*

VII. Support for Claim 7

A. ***The drill bit according to Claim 1, wherein said cutting elements comprise tungsten carbide inserts.***

1. Insert bits have very hard inserts (e.g. specially selected grades of tungsten carbide) pressed into holes drilled into the cone surfaces. *See Present Application, Page 4, lines 9-10.*

VIII. Support for Claim 8

A. ***The drill bit according to Claim 1, wherein said cutting elements comprise milled steel teeth.***

1. Steel-tooth bits have steel teeth formed integral to the cone. *See Present Application, Page 4, line 7.*

IX. Support for Claim 9

A. ***The drill bit according to Claim 8, wherein said cutting elements further comprise hardface coating.***

1. Steel-tooth bits have steel teeth formed integral to the cone. *See Present Application, Page 4, lines 7-9.*

X. Support for Claim 10

A. ***A roller cone drill bit, comprising:***

1. *See Present Application, Figure 11.*

B. ***a bit body;***

1. *See Present Application, Figure 11.*

C. ***three roller cones attached to said bit body and able to rotate with respect to said bit body; and***

1. *See Present Application, Figure 11.*

2. See Paragraph I(C)(2) above. *See Present Application, Page 12, lines 3-9.*

D. ***a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements***

being arranged such that an amount of work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.

1. See Paragraph II(A)(1). *See Present Application, Page 12, line 27 through Page 13, line 13.*

2. See Paragraph II(A)(2). *See Present Application, Page 15, line 28 through Page 16, line 4.*

3. See Paragraph II(A)(3). *See Present Application, Page 16, lines 9-18.*

XI. Support for Claim 11

A. ***The drill bit according to Claim 10, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.***

1. See Paragraph I(D)(1). *See Present Application, Page 7, lines 7-9.*

2. See Paragraph I(D)(5). *See Present Application, Page 26, lines 2-4.*

XII. Support for Claim 12

A. ***The drill bit according to Claim 10, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.***

1. See Paragraph III(A)(1). *See Present Application, Page 8, lines 20-21.*

2. See Paragraph III(A)(2). *See Present Application, Page 16, lines 14-18.*

3. See Paragraph III(A)(3). *See Present Application, Page 17, lines 5-8.*

4. See Paragraph III(A)(4). *See Present Application, Page 17, lines 23-24.*

5. See Paragraph III(A)(5). *See '466 Provisional, Pages 5 and 7.*

XIII. Support for Claim 13

A. ***The drill bit according to Claim 10, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.***

1. See Paragraph IV(A)(1). *See Present Application, Page 11, line 12 through Page 12, line 21.*

XIV. Support for Claim 14

A. ***The drill bit according to Claim 10, wherein a distribution of axial force on the bit is optimized.***

1. See Paragraph V(A)(1). *See Present Application, Page 1, lines 11-12.*

2. See Paragraph V(A)(2). *See Present Application, Page 7, line 32 through Page 8, line 2.*

3. See Paragraph I(D)(5). *See Present Application, Page 26, lines 2-4.*

XV. Support for Claim 15

A. ***The drill bit according to Claim 10, wherein said cutting elements comprise superhard inserts.***

1. See Paragraph VI(A)(1). *See Present Application, Page 4, lines 9-10.*

XVI. Support for Claim 16

A. ***The drill bit according to Claim 10, wherein said cutting elements comprise tungsten carbide inserts.***

1. See Paragraph VII(A)(1). *See Present Application, Page 4, lines 9-10.*

XVII. Support for Claim 17

A. ***The drill bit according to Claim 10, wherein said cutting elements comprise milled steel teeth.***

1. See Paragraph VIII(A)(1). *See Present Application, Page 4, line 7.*

XVIII. Support for Claim 18

A. ***The drill bit according to Claim 17, wherein said cutting elements further comprise hardface coating.***

1. See Paragraph IX(A)(1). *See Present Application, Page 4, lines 7-9.*

XIX. Support for Claim 19

A. ***A roller cone drill bit, comprising:***

1. *See Present Application, Figure 11.*

B. ***a bit body;***

1. *See Present Application, Figure 11.*

C. ***three roller cones attached to said bit body and able to rotate with respect to said bit body;***

1. *See Present Application, Figure 11.*

2. See Paragraph I(C)(2) above. *See Present Application, Page 12, lines 3-9.*

D. ***a plurality of cutting elements arranged on each of the cones so that cutting elements on adjacent cones intermesh between the adjacent cones, the cutting elements being arranged such that a distribution of axial force on the bit is optimized.***

1. See Paragraph V(A)(1). *See Present Application, Page 1, lines 11-12.*

2. See Paragraph V(A)(2). *See Present Application, Page 7, line 32 – Page 8, line 2.*

3. See Paragraph I(D)(5). *See Present Application, Page 26, lines 2-4.*

XX. Support for Claim 20

A. ***The drill bit according to Claim 19, wherein axial force exerted on the bit during drilling is substantially balanced between the cones.***

1. See Paragraph I(D)(1). *See Present Application, Page 7, lines 7-9.*

2. See Paragraph I(D)(5). *See Present Application, Page 26, lines 2-4.*

XXI. Support for Claim 21

A. ***The drill bit according to Claim 19, wherein said cutting elements are disposed on each cone, such that work performed by each cone during drilling is substantially the same as the work performed by each of the other cones.***

1. See Paragraph II(A)(1). *See Present Application, Page 12, line 27 through Page 13, line 13.*

2. See Paragraph II(A)(2). *See Present Application, Page 15, line 28 through Page 16, line 4.*

3. See Paragraph II(A)(3). *See Present Application, Page 16, lines 9-18.*

XXII. Support for Claim 22

A. ***The drill bit according to Claim 19, wherein a projected area of said cutting elements in contact with a formation during drilling is substantially the same for each of the cones.***

1. See Paragraph III(A)(1). *See Present Application, Page 8, lines 20-21*

2. See Paragraph III(A)(2). *See Present Application, Page 16, lines 14-18.*

3. See Paragraph III(A)(3). *See Present Application, Page 17, lines 5-8.*

4. See Paragraph III(A)(4). *See Present Application, Page 17, lines 23-24.*

5. See Paragraph III(A)(5). *See '466 Provisional, Pages 5 and 7.*

XXIII. Support for Claim 23

A. ***The drill bit according to Claim 19, wherein a depth of penetration for each cutting element into a formation during drilling is substantially the same for each of the cones.***

1. See Paragraph IV(A)(1). *See Present Application, Page 11, line 12 through Page 12, line 21.*

XXIV. Support for Claim 24

A. ***The drill bit according to Claim 19, wherein said cutting elements comprise superhard inserts.***

1. See Paragraph VI(A)(1). *See Present Application, Page 4, lines 9-10.*

XXV. Support for Claim 25

A. ***The drill bit according to Claim 19, wherein said cutting elements comprise tungsten carbide inserts.***

1. See Paragraph VII(A)(1). *See Present Application, Page 4, lines 9-10.*

XXVI. Support for Claim 26

A. ***The drill bit according to Claim 19, wherein said cutting elements comprise milled steel teeth.***

1. See Paragraph VIII(A)(1). *See Present Application, Page 4, line 7.*

XXVII. Support for Claim 27

A. ***The drill bit according to Claim 26, wherein said cutting elements further comprise hardface coating.***

1. See Paragraph IX(A)(1). *See Present Application, Page 4, lines 7-9.*